

CLAIMS

I claim:

1. An apparatus for grasping odd-shaped objects to relocate the same, comprising:

(a) an elongated upright main frame having opposite upper and lower ends, said main frame being attachable to a material handling vehicle for maneuvering said main frame between different heights and locations by operation of the material handling vehicle;

(b) a support member mounted to said main frame adjacent to said lower end thereof and being adapted for engaging an edge of an object;

(c) an arm member mounted to said main frame adjacent to said upper end thereof so as to undergo pivotal movement relative to said main frame;

(d) a tine mounting member mounted to said arm member so as to undergo pivotal movement relative to and independently of said arm member;

(e) at least one tine having a substantially curved configuration and being mounted to and extending outwardly and downwardly from said tine mounting member; and

(f) means for respectively pivotally moving said arm member relative to said main frame and said tine relative to said arm member through respective first and second arcuate paths toward and away from said support member and an object between said tine and support member such that said tine and support member together may grasp the object for relocating the object upon maneuvering of said apparatus by operation of the material handling vehicle.

2. The apparatus of claim 1 further comprising:

a pair of said tines being spaced apart from one another and mounted to and extending outwardly and downwardly from said tine mounting member.

3. The apparatus of claim 1 wherein said tines extend in substantially parallel relationship to one another.

Sub 109  
4. The apparatus of claim 1 wherein said pivotally moving means includes a main actuation mechanism mounted to said main frame and to said arm member and being extendable and retractable to pivotally move said arm member and tines therewith vertically through said first arcuate path relative to said main frame toward and away from said support member and an object disposed between said arm member and support member.

5  
5. The apparatus of claim 4 wherein said main actuation mechanism is a hydraulic cylinder mechanism.

Sub 109  
6. The apparatus of claim 1 wherein said pivotally moving means includes an auxiliary actuation mechanism mounted to said arm member and to said tine mounting member and being extendable and retractable to pivotally move said tine mounting member and tines therewith vertically through said second arcuate path relative to said arm member toward and away from said support member and the object between said tines and support member.

7. The apparatus of claim 6 wherein said auxiliary actuation mechanism is a hydraulic cylinder mechanism.

8. The apparatus of claim 1 wherein said support member includes:

an upright portion mounted to said main frame and disposed in a transverse relationship thereto adjacent to said lower end of said main frame; and

a base portion attached to said upright portion and extending outwardly therefrom so as to provide said support member in a substantially L-shaped configuration in cross-

section such that said upright portion can be placed against  
10 an edge of the object to be grasped and said base portion can  
be placed under the edge of the object to be lifted.

9. The apparatus of claim 1 wherein:

said main frame has opposite lateral sides; and

said arm member has a pair of interconnected links  
disposed in substantially parallel relation to and spaced  
5 apart from one another, each of said links having opposite  
outer and inner ends and being pivotally mounted at said inner  
end to one of said opposite lateral sides of said main frame  
at a location closer to said upper end than to said lower end  
of said main frame.

10. The apparatus of claim 9 wherein said tine mounting  
member is pivotally mounted to said outer ends of said links  
of said arm member.

*Sub 12*  
11. The apparatus of claim 1 further comprising:

a pair of upper and lower coupling members, said lower  
coupling member being fixedly mounted to said main frame at a  
location slightly higher than and on an opposite side of said  
5 main frame from said support member, said upper coupling  
member being spaced above said lower coupling member and  
fixedly mounted to said main frame at a location between and  
spaced from said lower and upper ends of said main frame, said  
upper and lower coupling members being adapted for attaching  
10 said apparatus to a lift mechanism of the material handling  
vehicle.

12. An apparatus for grasping odd-shaped objects to  
relocate the same, comprising:

(a) an elongated upright main frame having opposite  
upper and lower ends, said main frame being attachable to a  
5 material handling vehicle for maneuvering said main frame

between different heights and locations by operation of the material handling vehicle;

(b) a support member mounted to said main frame adjacent to said lower end thereof, said support member being adapted for engaging an edge of an object;

(c) an arm member mounted to said main frame at a location closer to said upper end than to said lower end of said main frame so as to undergo pivotal movement relative to said main frame;

(d) a tine mounting member mounted to said arm member so as to undergo pivotal movement relative to and independently of said arm member;

(e) a pair of tines spaced apart from one another and each having a substantially curved configuration and being mounted to and extending outwardly and downwardly from said tine mounting member;

(f) a main actuation mechanism mounted to said main frame and to said arm member and being extendable and retractable to pivotally move said arm member and tines therewith vertically through a first arcuate path relative to said main frame toward and away from said support member and an object disposed between said arm member and support member; and

(g) an auxiliary actuation mechanism mounted to said arm member and to said tine mounting member and being extendable and retractable to pivotally move said tine mounting member and tines therewith vertically through a second arcuate path relative to said arm member toward and away from said support member and the object between said tines and support member such that said main and auxiliary actuation mechanisms may be operated to cause and control pivotal movement of said arm member in relation to said main frame and pivotal movement of said tine mounting member and therewith said tines in relation to said arm member such that said apparatus when attached to the material handling vehicle is maneuverable by operation of

the material handling vehicle to a position adjacent to the object, said support member can be engaged against and under a near side of the object, said arm member can be lowered to a point where said tines contact a far side of the object, and then said tine mounting member and tines therewith can be pivoted such that said tines apply pressure to the far side of the object so that said tines and support member together can lift the object for movement to and placement at a desired location upon further operation of the material handling vehicle.

13. The apparatus of claim 12 wherein said tines extend in substantially parallel relationship to one another.

14. The apparatus of claim 12 wherein said main actuation mechanism is a first hydraulic cylinder mechanism.

15. The apparatus of claim 14 wherein said auxiliary actuation mechanism is a second hydraulic cylinder mechanism.

16. The apparatus of claim 12 wherein said support member includes:

an upright portion mounted to said main frame and disposed in a transverse relationship thereto adjacent to said lower end of said main frame; and

a base portion attached to said upright portion and extending outwardly therefrom so as to provide said support member in a substantially L-shaped configuration in cross-section such that said upright portion can be placed against an edge of the object to be grasped and said base portion can be placed under the edge of the object to be lifted.

17. The apparatus of claim 12 wherein:  
said main frame has opposite lateral sides; and  
said arm member has a pair of interconnected links

5 disposed in substantially parallel relation to and spaced apart from one another, each of said links having opposite outer and inner ends and being pivotally mounted at said inner end to one of said opposite lateral sides of said main frame at a location closer to said upper end than to said lower end of said main frame.

18. The apparatus of claim 17 wherein said main actuation mechanism is a first hydraulic cylinder mechanism being pivotally connected at one end to said outer ends of said links of said arm member and at an opposite end to said upper end of said main frame.

19. The apparatus of claim 17 wherein said tie mounting member is pivotally mounted to said outer ends of said links of said arm member.

20. The apparatus of claim 12 further comprising:  
a pair of upper and lower coupling members, said lower coupling member being fixedly mounted to said main frame at a location slightly higher than and on an opposite side of said main frame from said support member, said upper coupling member being spaced above said lower coupling member and fixedly mounted to said main frame at a location between and spaced from said lower and upper ends of said main frame, said upper and lower coupling members being adapted for attaching said apparatus to a lift mechanism of the material handling vehicle.